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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/064,624

07/31/2002

John Scott Price

Gem-0033

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08/24/2004

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EXAMINER

HO, ALLEN C

ART UNIT

PAPER NUMBER

2882

DATE MAILED: 08/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/064,624

Applicant(s)

PRICE ET AL.

Examiner

Allen C. Ho

Art Unit

2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 August 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 and 29-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-20, 23 and 24 is/are allowed.
- 6) ☒ Claim(s) 21, 22, 25, 26 and 29-31 is/are rejected.
- 7) ☒ Claim(s) 27 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. The amendment after final rejection filed on 04 August 2004 has been entered.
2. The indicated allowability of claims 25 and 31 is withdrawn in view of the newly discovered reference(s) to Beland (U. S. Patent No. 6,738,275 B1) and Ulaby. Rejections based on the newly cited reference(s) follow.

Accordingly, the finality of the rejection of the last Office action is withdrawn.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 21 and 22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 21 and 22 recite "the x-ray tube having an anode and a cathode disposed in the x-ray tube to provide a gap voltage there between". However, as understood by persons skilled in the art, the gap voltage is generated by a power supply, not by the x-ray tube. Furthermore, there is no connection between the electrical energy and the gap voltage.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2882

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 25, 26, 29, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Halavee (U. S. Patent No. 6,324,257 B1) in view of Beland (U. S. Patent No. 6,738,275 B1) and Ulaby.

With regard to claim 25, Halavee disclosed a power supply cable for an x-ray tube (7) comprising: a waveguide (4) configured to transfer optical energy to the x-ray tube; an electrical conductor (3a, 3b) configured to transfer electrical energy to the x-ray tube, the electrical conductor surrounding at least a portion of the waveguide along a length of the cable; and an insulation material (10) disposed between the waveguide and the electrical conductor, the insulation material surrounding the waveguide and the electrical conductor.

However, Halavee failed to teach that the electrical conductor is configured to use a transmission line effect of a pulse train of power to maximize voltage at the x-ray tube.

Beland taught that reflections occur in a transmission line, causing arcing between anode and cathode in an x-ray tube. The result would be catastrophic for the output components of an unprotected x-ray generator (column 2, line 56 - column 3, line 28).

Ulaby taught that the reflection is eliminated when the load impedance (Z_L) is matched to the characteristic impedance (Z_0) of the transmission line (p. 50), while at the same time the average power (P_{av}) delivered to the load is maximized (p. 65).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to configure the electrical conductor to use a transmission line effect to

Art Unit: 2882

optimize power transmission, since a person would be motivated prevent damage to the x-ray generator.

With respect to claim 26, Halavee disclosed the cable of claim 25, wherein the electrical conductor includes two electrical conductors (3a, 3b) surrounding at least a portion of the waveguide (4), the two electrical conductors configured to optimize a skin effect for pulsed power current transmission through the two electrical conductors (This is inherent. The skin effect is always present and optimized according to the shapes of the conductors).

With respect to claim 29, Halavee disclosed the cable of claim 25, wherein the waveguide includes one of an optical fiber and a bundle of optical fibers (column 7, lines 66-67; column 8, lines 1-3).

With respect to claim 30, Halavee disclosed the cable of claim 25, wherein the waveguide is made from one of a plastic and a glass (column 8, lines 3-5).

7. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Halavee (U. S. Patent No. 6,324,257 B1) in view of Fehre *et al.* (U. S. Patent No. 6,418,191 B1) and Beland (U. S. Patent No. 6,738,275 B1) and Ulaby.

With regard to claim 31, Halavee disclosed a method to reduce the size of a power cable supplying an x-ray tube, the method comprising: employing an optical waveguide (4) to transfer optical energy to an electron source (9) triggered by photon energy to initiate release of electrons; disposing circumferentially (Fig. 4a) an accelerating potential conductor (3a, 3b) about the waveguide; and disposing an insulating material (10) between the conductor and the waveguide, the insulation material surrounding the conductor and a periphery of the waveguide.

However, Halavee failed to teach that the method further comprising the steps of: configuring the conductor taking into account skin effect to reduce the thickness thereof; and the conductor is configured to use a transmission line effect of a pulse train of power to maximize voltage at the x-ray tube.

Fehre *et al.* taught that consideration of the skin effect results in lower use of conducting material (column 2, lines 55-60), producing a flexible and pliable power cable. Furthermore, the low ohmic impedance leads to low losses (column 2, lines 53-54).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to configure the conductor taking into account skin effect to reduce the thickness thereof, since a person would be motivated to produce a flexible cable that minimizes losses in the transmission.

Beland taught that reflections occur in a transmission line, causing arcing between anode and cathode in an x-ray tube. The result would be catastrophic for the output components of an unprotected x-ray generator (column 2, line 56 - column 3, line 28).

Ulaby taught that the reflection is eliminated when the load impedance (Z_L) is matched to the characteristic impedance (Z_0) of the transmission line (p. 50), while at the same time the average power (P_{av}) delivered to the load is maximized (p. 65).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to configure the electrical conductor to use a transmission line effect to optimize power transmission, since a person would be motivated prevent damage to the x-ray generator.

Allowable Subject Matter

8. Claims 1-20, 23, and 24 are allowed over the prior art.
9. Claims 21 and 22 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.
10. Claim 27 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
11. The following is a statement of reasons for the indication of allowable subject matter:

With regard to claims 1-20, although the prior art discloses a power supply configured to provide optical energy and an anode-to-cathode gap voltage via electrical energy, it fails to teach or fairly suggest that the power supply is configured to provide an anode-to-cathode voltage greater than 150 kV as claimed.

With regard to claims 21 and 22, although the prior art discloses a method comprising the step of connecting a power supply to an x-ray tube with a means for transferring an optical energy and a gap voltage from the power supply to an x-ray tube, it fails to teach or fairly suggest that the power supply is configured to provide a gap voltage greater than 150 kV as claimed.

With regard to claims 23 and 24, although the prior art discloses a power supply configured to provide optical energy generating photons and electrical energy generating an anode-to-cathode gap voltage, it fails to teach or fairly suggest that the power supply is configured to provide an anode-to-cathode gap voltage greater than 150 kV as claimed.

With regard to claim 27, although the prior art discloses a power supply cable comprising a waveguide and two electrical conductors surrounding at least a portion of the waveguide, it fails to teach or fairly suggest that each electrical conductor is configured as a portion of a cylindrical wall disposed proximate a periphery of the cable as claimed.

Response to Arguments

12. Applicant's arguments filed 04 August 2004 with respect to claim 4 have been fully considered and are persuasive. The rejection of claim 4 under U.S.C. §112 second paragraph has been withdrawn.

13. Applicant's arguments with respect to claims 25, 26, 29, and 30 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

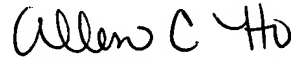
- (1) Greenwald *et al.* (U. S. Patent No. 6,661,875 B2) disclosed a catheter tip x-ray source.
- (2) Gareis *et al.* (U. S. Patent No. 5,557,698) disclosed a coaxial fiber optical cable.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen C. Ho whose telephone number is (571) 272-2491. The examiner can normally be reached on Monday - Friday from 8:00 am - 5:00 pm.

Art Unit: 2882

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward J. Glick can be reached at (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Allen C. Ho
Patent Examiner
Art Unit 2882